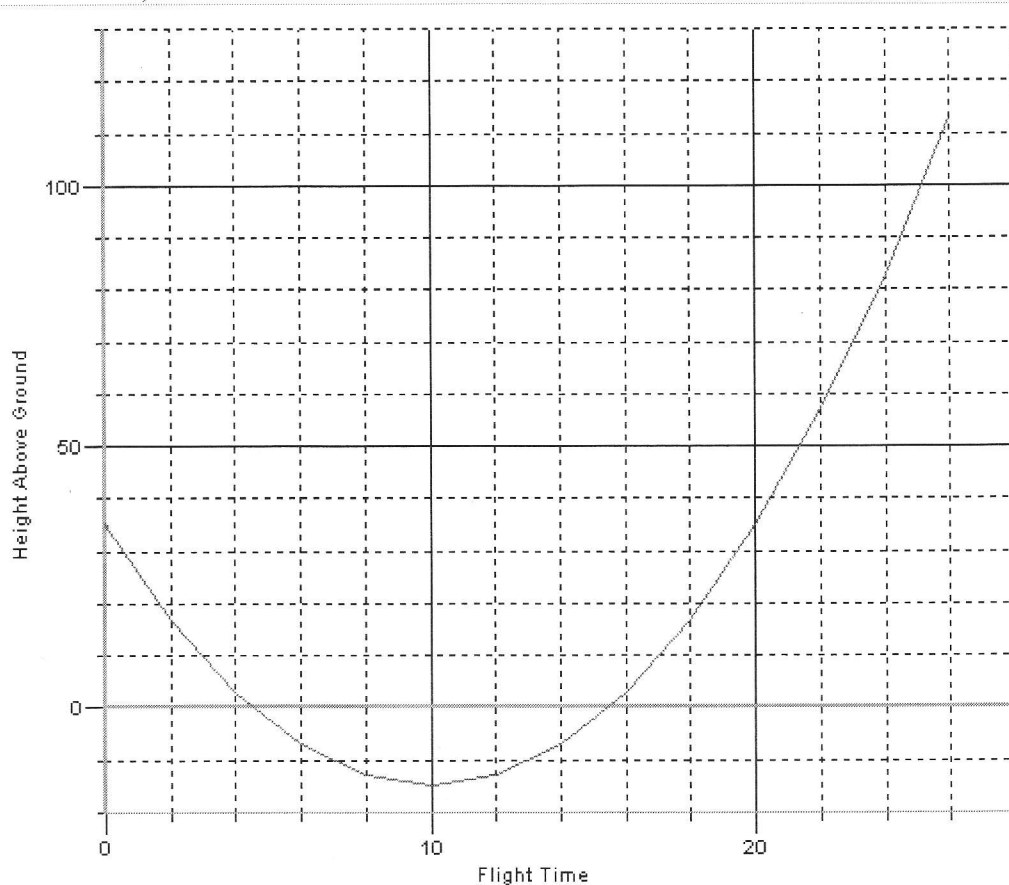


3C Practice Exam

1. Tatiana has walked to a water tower beside a nearby gorge in order to launch her newly designed paper airplane. The graph below shows the flight of the paper airplane. A negative height means the airplane is below the level of the ground. (Height in feet and time in seconds)



1. Estimate the height of the water tower ≈ 35 ft
2. How long does it take for the paper airplane to reach its minimum height?
10 sec
3. How high is the minimum height? ≈ -15 ft
4. When has the paper airplane reached ground level? ≈ 4.3 sec & ≈ 15.5 sec
5. Write the vertex of this parabola: (10, -15)
6. Will the airplane continue in a parabolic path? Explain why or why not. No, gravity
7. Which equation best describes the above graph?

a. $y = a(x - 15)^2 + 10$

b. $y = -a(x - 15)^2 + 10$

c. $y = -a(x - 10)^2 - 15$

d. $y = a(x + 10)^2 - 15$

2. For the equation $y = 3x^2 + 18x + 15$

a) find the step pattern

3, 9, 15

b) write the equation in factored form

$$= 3x^2 + 18x + 15$$

$$= 3(x^2 + 6x + 5)$$

$$= 3(x + 1)(x + 5)$$

c) state the zeros

-1 & -5

d) find the vertex

axis of symmetry

$$x = \frac{-1 + (-5)}{2}$$

$$x = \frac{-6}{2}$$

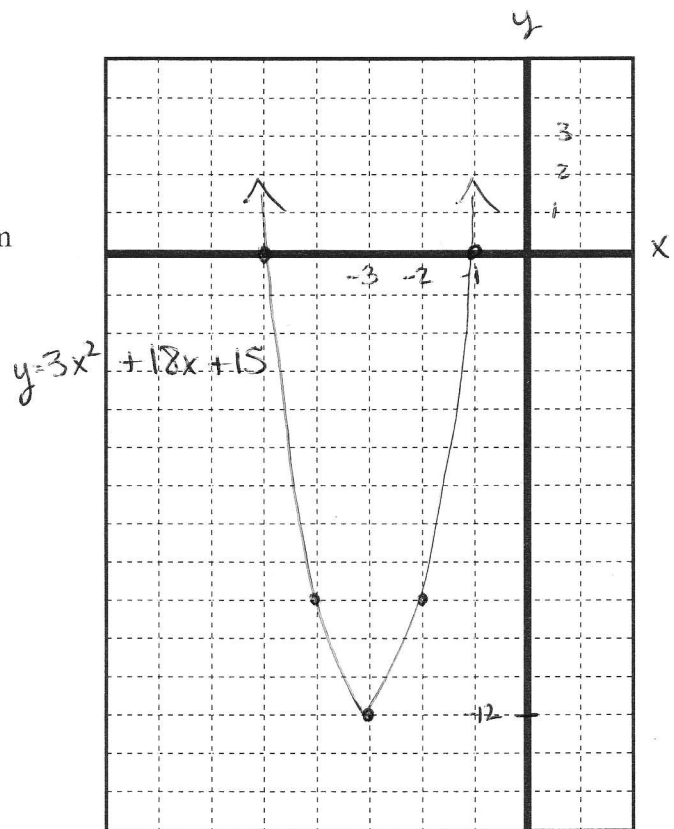
$$x = -3$$

Vertex $(-3, -12)$

e) write the equation in vertex form

$$y = 3(x + 3)^2 - 12$$

f) graph it



Sub $x = -3$ into equation

$$\begin{aligned} y &= 3(-3 + 1)(-3 + 5) \\ &= 3(-2)(2) \\ &= -12 \end{aligned}$$

3. Change the following into factor form:

a) $x^2 + 2x - 48$

$= (x + 8)(x - 6)$

b) $2x^2 - 4x - 16$

$= 2(x^2 - 2x - 8)$
 $= 2(x + 2)(x - 4)$

c) $4x^2 + 12x + 8$

$= 4(x^2 + 3x + 2)$
 $= 4(x + 1)(x + 2)$

4. Change the following into ~~vertex~~^{standard} form:

a) $(x - 5)(x + 3)$

$= x^2 + 3x - 5x - 15$
 $= x^2 - 2x - 15$

b) $(x - 4)^2 + 10$

$= (x - 4)(x - 4) + 10$
 $= x^2 - 4x - 4x + 16 + 10$
 $= x^2 - 8x + 26$

5. Identify each of the following equations as either: linear, exponential or quadratic.

a) $y = -0.35^x$

exponential

b) $y = 2x(x + 5)$

quadratic

c) $y - 0.55x = 7$

linear

d) $y = 2(1.15)^x$

exponential

6. Write as a "**SINGLE POWER**". Then, Evaluate.

a) $2^3 \times 2^6 = \underline{2^9}$
 $= \underline{512}$

b) $5^3 \times 5^{-6} = \underline{5^{-3}}$
 $= \underline{0.008}$

c) $5^4 \div 5^2 = \underline{5^2}$
 $= \underline{25}$

d) $4^{-2} \div 4 = \underline{4^{-3}}$
 $= \underline{0.015625}$

e) $3^{-1} \div 3^3 = \underline{3^{-4}}$
 $= \underline{0.012346}$

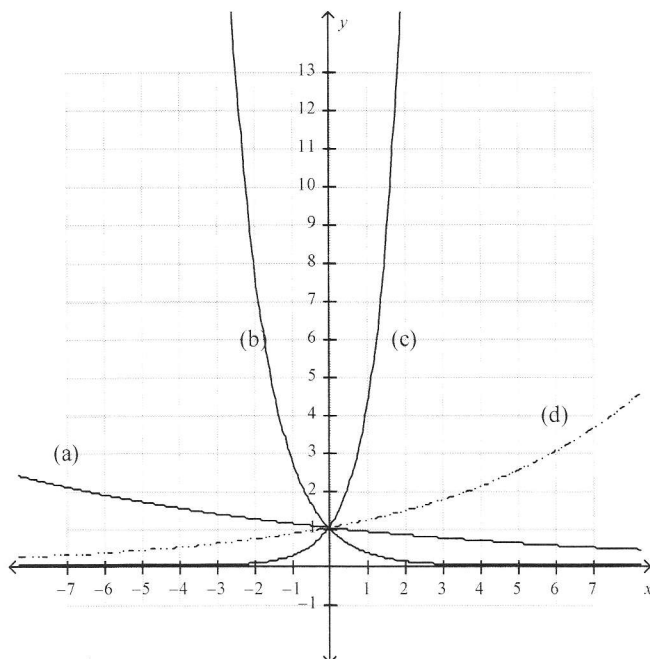
f) $-(2^2)^3 = \underline{-2^6}$
 $= \underline{-64}$

i) $\frac{3^2 \times 3}{3^3} = \underline{1}$

g) $40(2)^{-4} = \underline{2.5}$ h) $(3^5)^0 = \underline{1}$

7. Match each equation with its graph.

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i) $y = 4^x$ (c)

ii) $y = 1.2^x$ (d)

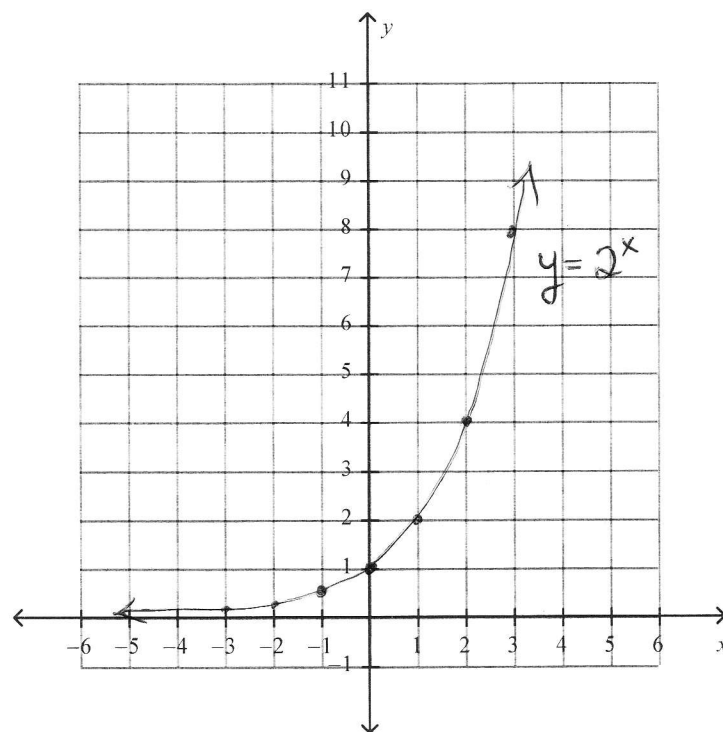
iii) $y = 0.9^x$ (a)

iv) $y = 0.35^x$ (b)

8. Complete the table and values and graph the following exponential function.

/4

$y = 2^x$	
x	y
-3	0.125
-2	0.25
-1	0.50
0	1
1	2
2	4
3	8



9. Georgia needs to borrow \$2500 for 2 years. She has a choice of 2 interest rates.

- i. 12% compounded monthly
- ii. 12.1% compounded annually

Georgia says that she will pay less interest using the first (i) option because the interest rate is lower. Is she correct? Justify your answer.

i) 12% compounded monthly

$$A = P(1 + i)^n$$

$$= 2500 \left(1 + \frac{0.12}{12}\right)^{24}$$

$$= 3174.34$$

/3

ii) 12.1% compounded annually

$$A = P(1 + i)^n$$

$$= 2500 \left(1 + \frac{0.121}{1}\right)^2$$

$$= 3141.60$$

∴ Georgia is wrong. She will pay less interest using option ii)

10. Kadeem's investment matured from \$1300 to \$1750. It was invested at a simple interest rate of 4.25%. How long was it invested for?

$$I = Prt$$

$$t = \frac{I}{Pr}$$

$$t = \frac{450}{(1300 \times 0.0425)}$$

$$t = 8.14$$

$$I = 1750 - 1300$$

$$= 450$$

∴ it was invested for 8.14 years.

11. Peter invested in a GIC that paid 3.25% simple interest. In 36 months, he earned \$485. How much did he invest originally?

$$I = Prt$$

$$P = \frac{I}{rt}$$

$$P = \frac{485}{(0.0325 \times 3)}$$

$$= 4974.36$$

∴ he invested \$4974.36 originally.

12. What rate of simple interest is needed for \$700 to double, in 3 years? \$1400

$$I = 700$$

$$P = 700$$

$$r = ?$$

$$t = 3$$

$$r = \frac{I}{Pt}$$

$$= \frac{700}{(700 \times 3)}$$

$$= 0.33$$

∴ the rate was 33.33%

$$I = Prt$$

$$r = \frac{I}{Pt}$$

13. Gary and Kayla are playing dice in the cafeteria during their spare. Gary's die is a six-sided die with the numbers 1, 2, 3, 5, 6, 6 on it and Kayla's die is an eight-sided die with the numbers 1, 1, 2, 2, 3, 5, 6, 7 on it. They each roll their own die and whosever roll is the largest wins a dollar. If the two rolls are the same, they re-roll

DO NOT JUST FILL IN THE CHART WITH SUMS – READ THE QUESTIONS FIRST

Gary

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Kayla

	1	2	3	5	6	6
1	(T)	G	G	G	7 _G	7 _G
1	(T)	G	G	G	7 _G	7 _G
2	K	(T)	G	7 _G	8 _G	8 _G
2	K	(T)	G	7 _G	8 _G	8 _G
3	K	K	(T)	8 _G	9 _G	9 _G
5	K	7 _K	8 _K	10 _(T)	11 _G	11 _G
6	7 _K	8 _K	9 _K	11 _K	12 _(T)	12 _(T)
7	8 _K	9 _K	10 _K	12 _K	13 _K	13 _K

- (a) What is the theoretical probability that they have to re-roll?

$$= \frac{8}{48} \times 100$$

$$= 16.67\%$$

∴ they would have to re-roll 16.67% of the time.

- (b) What is the theoretical probability that Gary wins?

$$= \frac{23}{48} \times 100$$

$$= 47.92\%$$

∴ Gary will win 47.92% of the time.

- (c) What is the theoretical probability that the two rolls add up to more than six?

$$= \frac{30}{48} \times 100$$

$$= 62.5\%$$

∴ the theoretical probability that the 2 rolls add up to more than six is 62.5%

Now they roll the two dice ten times and get sums of: 2, 3, 3, 13, 13, 13, 10, 10, 4, 3

- (d) What is the probability of rolling a 2? $\frac{1}{10}$ ∴ the probability of rolling a 2 is $\frac{1}{10}$

- (e) What is the probability of rolling a 13? $\frac{3}{10}$ ∴ the probability of rolling a 13 is $\frac{3}{10}$.

14. a) Find the mean, median, mode and range for each set of data.

i) 64, 69, 72, 54, 89, 92, 54, 32

$$\text{mean} = \frac{526}{8} \\ = 65.75$$

$$\text{mode: } 54 \\ \text{range: } 92 - 32 \\ = 60$$

$$\text{median: } 32, 54, 54, \boxed{64, 69}, 72, 89, 92 \\ = \frac{64 + 69}{2} \\ = 66.5$$

ii) 62, 74, 54, 31, 32, 65, 88, 25

$$\text{mean} = \frac{431}{8} \\ = 53.88$$

mode: none

$$\text{median: } 25, 31, 32, \boxed{54, 62}, 65, 74, 88 \\ = \frac{54 + 62}{2} \\ = 58$$

$$\text{range: } 88 - 25 \\ = 63$$

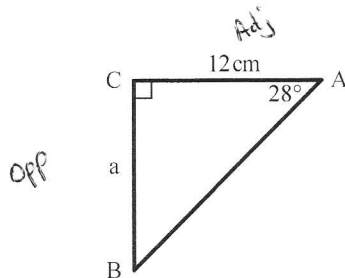
b) Based on the data analysis above, which set of data is more closely related?

Data set i)

higher average
lower range.

15. Solve for the unknown side. To the nearest tenth.

SOH CAH TOA



$$\tan \theta = \frac{O}{A}$$

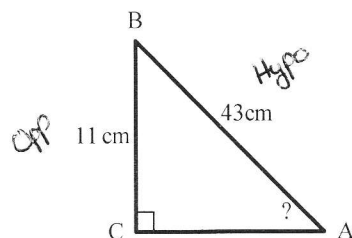
$$\tan 28^\circ = \frac{a}{12}$$

$$a = 12 \tan 28^\circ$$

$$a \approx 6.38$$

∴ side a is ≈ 6.4 cm

16. Solve for the unknown angle? To the nearest degree.



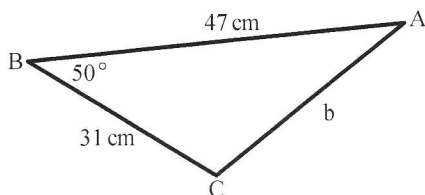
$$\sin \theta = \frac{O}{H}$$

$$\sin^{-1}(\sin \theta) = \sin^{-1}\left(\frac{11}{43}\right)$$

$$\theta \approx 14.82^\circ$$

∴ the unknown angle is 15°

17. Solve for the unknown side. To the nearest tenth.



$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$b^2 = 31^2 + 47^2 - 2(31)(47) \cos 50^\circ$$

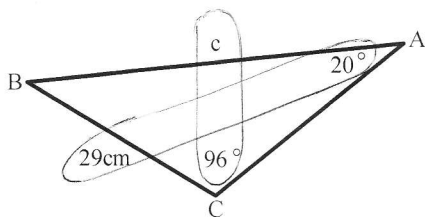
$$b^2 = 1296.916905$$

$$\sqrt{b^2} = \sqrt{1296.916905}$$

$$b \approx 36.01$$

\therefore side is 36.0 cm

18. Solve for the unknown side. To the nearest tenth.



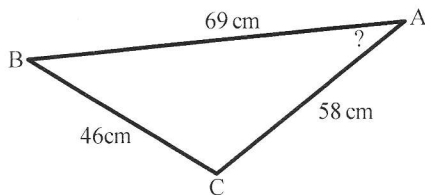
$$\frac{c}{\sin 96^\circ} = \frac{29}{\sin 20^\circ}$$

$$c = \frac{29 \sin 96^\circ}{\sin 20^\circ}$$

$$c \approx 84.33$$

\therefore side c 84.3 cm

19. Solve for the unknown angle. To the nearest degree.



$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$46^2 = 58^2 + 69^2 - 2(58)(69) \cos A$$

$$2116 = 3364 + 4761 - 8004 \cos A$$

$$2116 = 8125 - 8004 \cos A$$

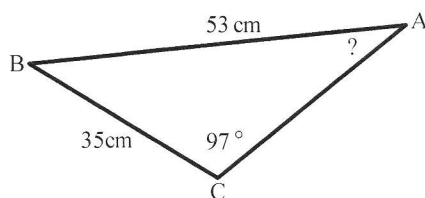
$$8004 \cos A = 8125 - 2116$$

$$\frac{8004 \cos A}{8004} = \frac{6009}{8004}$$

$$\cos^{-1}(\cos A) = \cos^{-1}\left(\frac{6009}{8004}\right)$$

$\rightarrow A \approx 41.34^\circ$
 \therefore the unknown angle is 41°

20. Solve for the unknown angle. To the nearest degree.



$$\frac{\sin A}{35} = \frac{\sin 97}{53}$$

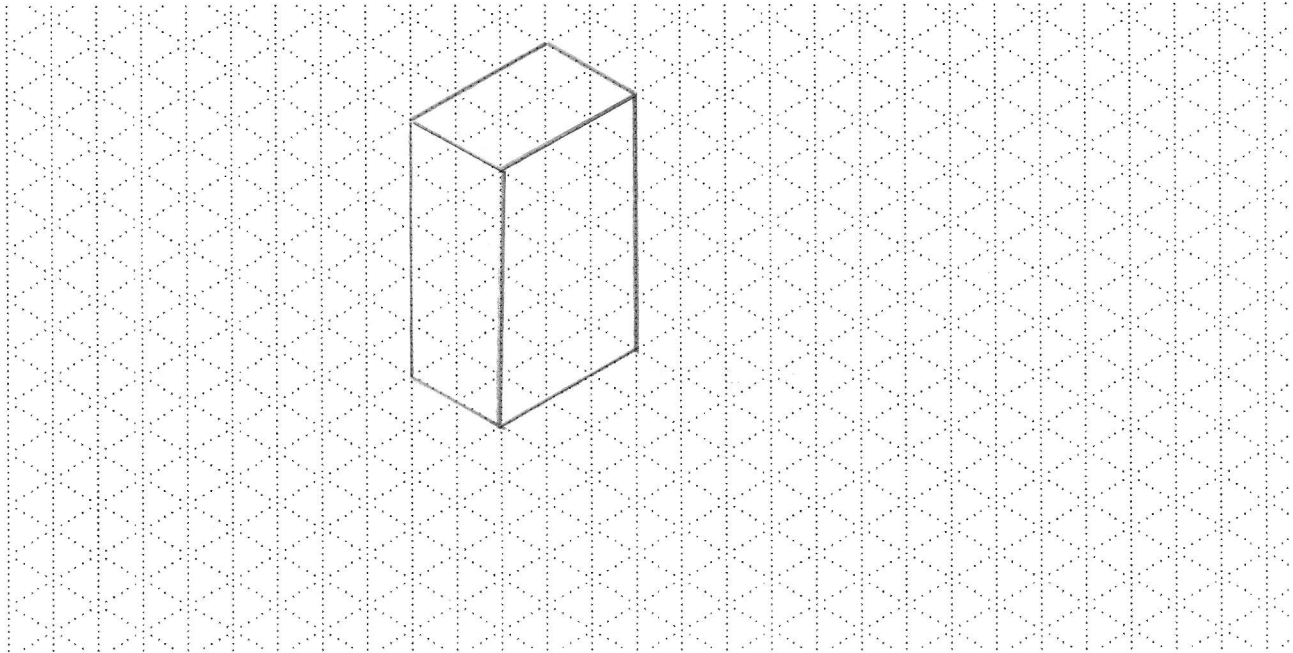
$$\sin A = \frac{35 \sin 97}{53}$$

$$\sin^{-1}(\sin A) = \sin^{-1}\left(\frac{35 \sin 97}{53}\right)$$

$$A \approx 40.95$$

$\therefore \angle A$ is 41°

21. Draw an isometric drawing of a rectangular prism that is 4m x 6m x 10m Scale: 1 box = 2m



22. Draw a 2m x 4m x 5m rectangular prism in the space below with a scale of 1 unit = 1 metre.

